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INDIAN FISHING IN NORTH AMERICA.

[Chippeway Indians fishing on the American River Thames.]

Some account of the Chippeway Indians was given in No. 325 of the 'Penny Magazine.' Mackenzie, in his account of his voyages from Montreal to the Pacific and the Frozen Oceans, says, that when the French missionaries first visited the shores of Lake Superior, they found the country full of inhabitants; but their numbers are now greatly diminished. Scanty remnants of the Chippeways are living under the protection of the British government, and lead a kind of half-civilized life, but retaining much of their primitive habits in obtaining subsistence. They are described by Mackenzie (who spent many years in the north and north-west territory towards the close of the last century,) as not being "remarkable for their activity as hunters, which is owing to the ease with which they snare deer and spear fish: and these occupations are not beyond the strength of their old men, women, and boys; so that they participate in those laborious occupations which among their neighbours are confined to the women." * * * "The country," he adds, in another part of his work, "which these people claim as their land [Mackenzie means the country north and north-west of Lake Superior, to which his description applies, and not the more fertile country round the great lakes] has a very small quantity of earth, and produces little or no wood or herbage. Its chief vegetable substance is the moss, on which the deer feed; and a kind of rock-moss, which, in times of scarcity, preserves the lives of the natives. When boiled in water, it dissolves into a clammy glutinous substance, which affords a very sufficient nourishment. But, notwithstanding the barren state of their country, with proper care and economy, these people might live in great comfort,—for the lakes abound with fish, and the hills are covered with deer. Though, of all the Indian people of this continent, they are considered as the most provident, they suffer severely at certain seasons, and particularly in the dead of winter, when they are under the necessity of retiring to their scanty, stinted woods." This was written nearly forty years ago. The approaches of emigration have assisted to ameliorate the condition of those who still remain.

The view given above represents Chippeway Indians fishing on the River Thames. The Thames is the name given to a river of considerable size, which rises in the country between lakes Ontario and Huron, and, after passing several settlements bearing English names, such as Oxford, London, and Chatham, falls into Lake St. Clair. The correspondent who has supplied this sketch, as well as the previous one in No. 325, states that it was taken on the upper part of the River Thames. The mode of fishing represented in the engraving requires a dexterity in its management which scarcely any but an Indian can achieve. Two Indians occupy a canoe in the centre of the stream. One poises himself on each edge of the vessel in front, the other in a similar way behind: each has a fish-spear. The canoe, though probably in the centre of a rapid

stream, amid rocks, and shoals, and eddies, is kept perfectly steady, and in a straight course, by occasional thrusts and shoves at any object which presents itself, —an overhanging or sunken rock, or the broken trunk of a fallen tree. The labour of keeping the boat steady does not interfere with the spearing of the fish, which is carried on in silence, and with unceasing attention. The fish, as caught, are jerked off the spear into the boat; they are afterwards handed over to the women, who clean them, and dry them by suspending them from a stick over a smoky fire, as represented in the engraving. Our correspondent, who has had opportunities of observing the habits of the Indians, says, that this mode of catching fish never fails to attract the attention of Europeans, from the dexterity with which it is done, and the seeming danger of the operation. The Indians resort to the streams and rapids in spring and autumn, as the fish are then *running*—attempting the passes in shoals.

Another correspondent has supplied an account of his fishing adventures in the same quarter of America. "Near Fort Erie," he says, "the waters of the lake escape over a low barrier of limestone rock, and thence form the Niagara River. A little below this outlet I used to amuse myself on the fine summer nights with spearing bass (two or three sorts), pickerel, white fish, salmon-trout, herring, muskanungee (large pike), perch, &c. The mode I adopted was that of the Indians. Accompanied by another person to steer my canoe, with a few blazing pine-knots in an elevated basket of iron-wire fixed in the bow of the vessel, we would launch ourselves on the eddies and slack waters of the river, and drift silently along with the current. My steersman would sit with his paddle in the stern of the canoe, while I stood, spear in hand, as near the blazing fire as practicable. There are shoals of small fish frequenting the shores and shallows in the summer season, when, soon after nightfall, the larger fish leave the deep water and go in quest of the small fry, upon which they prey. I have sometimes found them in such abundance, that at nearly every plunge of my trident I brought a good-sized fish into the canoe. Sometimes we happened to fall in with an overgrown muskanungee, weighing sixty or seventy pounds, on which occasions I would resign my spear to my steersman (who was all but amphibious); who, having struck the barbed prongs into the body of the fish, at a single bound would jump astride of the wounded and alarmed creature, and away they would flounder together through the water. It then became my duty to paddle after them as close as possible, in order to afford my companion the benefit of the light in the canoe, as well as to have my small vessel at hand, in case the fish and the fisherman got into deep water. If the fish could be prevented from attaining this object (which it invariably attempted), then its fate was all but certain; for where the water was sufficiently shallow to admit of it, the dexterous fisherman would rest his whole weight upon the pike's back, through which means, and the loss of blood, it was soon compelled to yield up the contest. This amusement was never practised but when the water was unruffled and the weather moderately warm. The waters of Lake Erie being rather shallow, they consequently become warm by the continual action of the sun during June, July, and August, to a degree the waters of our lakes and rivers never attain. The plan I have mentioned was but a rude mode of fishing, but it was nevertheless a productive one; and for the want of some other more refined and intellectual I sometimes practised it, induced to do so by the two-fold consideration of profit and amusement."

THE AMERICAN CIDER-MILL—CIDER-ROYAL AND CIDER-WINE.

[From a Correspondent.]

Cider may be considered as the common beverage of the great bulk of the people of America (except in some of the larger towns and cities, where malt-liquor has partially superseded it). Some account, therefore, of their manner of making it, and of manufacturing it into *cider-royal* and *cider-wine*, may be generally interesting.

In the interior of America everything is made of wood, wherever possible for timber to answer, even imperfectly, the purposes to which iron and stone are commonly applied in older and less wooded countries. This, in a great measure, is owing to the cheapness of timber (which, often, is absolutely valueless to the owner of the soil on which it grows),—but also, in part, to the farmer's capability of performing the whole, or the greatest portion of the required labour with his own hands, (for where is there an American farmer who is not a sort of carpenter?) which he would be unable to do were the works to be constructed principally of iron or stone. This being the case, the American "cider-mills" are made wholly of wood, neither stone nor iron being required in their construction; in some cases, scarcely so much of the latter material as a common-sized nail is employed by the domestic architect. The American cider-mill consists of two distinct parts—that where the apples are ground or crushed, and that where the juice or cider is expressed. The first part consists of two upright hard-wood cylinders, of fifteen or eighteen inches diameter, the length being somewhat greater. The cylinders are placed in a strong frame, and in such a manner that a lever inserted into an upright shaft, which rises above the frame, turns one of them, and that one acting upon the other by means of cogs, inserted irregularly into the face of each of the cylinders, but so as to correspond as they revolve, turns the other. Immediately above the cylinders is placed a hopper, into which the apples are put; and it is so contrived that as the cylinders revolve the apples fall in between them from an opening in the bottom of the hopper, and having been completely crushed, they fall into the receiving-trough, which is placed directly underneath. As the cylinders can be brought into the closest contact by the use of wedges, it may easily be supposed that the apples will receive a complete mashing, although but a small portion of the seeds are bruised; but the Americans do not consider it necessary to bruise the seed of the apples in order to obtain good cider. The lever attached to one of the cylinders is made of a suitable shape and length for the purpose of being worked by a horse, which part of the process is denominated "apple-grinding."

As near as convenient to the scene of grinding, the expressing department is situated;—which, properly enough, is called "the press." It consists of a pair of very stout upright timbers, or posts, connected at the top by a cross piece of timber equally strong, which is perforated with a couple of holes for the purpose of receiving two long and stout wooden screws. At a convenient height from the ground a platform of stout planks is formed, upon which "the cheese" (as the bruised apples are termed when formed with straw into a circular pile on the platform,) is placed, preparatory to the juice being expressed. And here, again, in the construction of the "cheese," we may observe the domestic economy of the American cider-maker; for instead of enclosing the "must" (as the ground apples are called in England) in a coarse hair-cloth, he substitutes clean rye or wheat straw, and he manages this part of the business in the following manner:—In the first place he spreads a thin covering of straw upon the

platform, and thereupon a stratum of ground apples of three or four inches in thickness. It is absolutely necessary that the ends of the straw should project fifteen or eighteen inches beyond the apples, because the straw has to be bent upwards, and the ends brought sufficiently inwards, upon the apples; so that when another course of straw is spread upon the first stratum of apples, and more apples placed upon it, the bends of the first course of straw will prevent the apples from being pushed out when pressure is applied; and the weight of each succeeding stratum of apples keeps the ends of each succeeding course of straw in their proper place. Thus by a constant succession of apples and straw a "cheese" of any altitude may be formed, but one of four or five feet in thickness is considered a convenient size; this, however, in a great measure depends upon the quantity of apples on hand, as well as upon the capacity of the press. When the building of the "cheese" is completed, stout planks are placed upon it, and the screws are brought to act upon the planks by means of handspikes or levers. It should have been observed, that a circular groove is cut in the platform, outside the foundation of the cheese, with an outlet on one side for the escape of the liquor into proper vessels placed below for its reception. When the cheese ceases to give out more juice, the cider-maker pares off its outer extremity, where the folded straw forms an obstruction to the free escape of the liquor; and then the screws are again applied, until nothing remains to be given out by the mass of straw, and, now, sapless apples. The juice is then put into barrels, where it is permitted to remain unclosed until the fermentation has partially subsided, when it is closely bunged up, and in the course of two or three months considered fit for use. Many of the cider-makers introduce half a gallon of common whisky into a barrel containing something over thirty gallons of cider; but, although it may increase its strength, it tends to give it an unpleasant flavour. Brandy is used occasionally; and were it necessary to make use of ardent spirits at all, there can be no doubt but that brandy improves cider a great deal more than common whisky. They tell you that this mixing of spirits with cider is not done for the sake of increasing the strength of this common beverage, but to prevent it from becoming sour. Indeed, it is somewhat difficult, where the summers are very hot, and the cellars of the farm-houses but imperfectly constructed, to keep cider long without its becoming "hard" (sourish). Many of the members of the Temperance Societies are most inveterate cider-drinkers; and it is sometimes a little amusing to hear them make anxious inquiries, previous to their gulping down two or three tumblers of cider, whether or not ardent spirits had been mingled with it,—lest they should unwittingly swallow that which they had forsworn the use of; apparently unmindful of the fact, that pure cider, without any additional spirit, probably contains one-tenth or one-twelfth of that very principle, alcohol, which they so properly abominate.

The best cider-fruit in America is the Virginian crab; but as there is little attention paid to the kind or quality of the apples generally used for cider-making throughout the greater portion of the country, one but seldom meets with really good and delicious cider; although from the great heat and dryness of the climate during the summer, a superior flavour is imparted to the apples, and thence, of course, to the cider also. From eight to nine bushels of apples, Winchester measure, will yield a barrel of cider containing thirty-two or thirty-three gallons.

Cider-royal, or, as our plain republican connexions on the other side of the Atlantic—probably from some ancient antipathy to the word *royal*—now denominate it, *cider-oil*, is made by reducing common cider by the process of boiling. By this means, when cider is very abundant, and consequently very cheap, many of the country people will boil down three or four barrels into one; so that boiled cider is much richer, as well as more intoxicating, than when in its ordinary state. Besides, it keeps much better, and longer, when it has thus acquired more body and strength by this mode of evaporation. Although cider-oil is luscious and inebriating, it is by no means a pleasant drink, or calculated to allay thirst, and therefore it is not brought to table as an every-day beverage, but kept for seasons of merry-making; or to present, on particular occasions, to persons of more than ordinary consideration.

Cider-wine is the name given by the Americans to such cider as has been reduced in bulk by the action of severe frost; while at the same time its strength is increased in a proportion nearly corresponding to the reduction which takes place, and this seems the principal reason why it is called cider-wine. The plan adopted to reduce cider to this state, is to expose it for some time to the action of severe frost during the winter season. A barrel of common cider is emptied into a wide and shallow vessel, which is placed in a situation where it may be freely acted upon by the frost. Ice then forms on the surface of the cider, according to the degree of cold, which having been removed once or twice in the twenty-four hours for a number of successive days, a large portion of the aqueous part of the cider will have been subtracted in the form of ice; while nearly all the spirituous part remains behind in the vessel. I have frequently known cider reduced to a fourth or fifth of the original bulk in this way; but attempts at a further reduction do not very well succeed; for it is then found that a considerable portion of the spirit becomes embodied in the ice along with the water.

After the cider has been sufficiently reduced in this way, the *cider-wine*, as it is then called, is either returned into clean casks, or else bottled; and in either case it ought to be kept where there is a moderate degree of temperature. The flavour of the best quality of cider-wine is still *ciderish;* but where other and better wine is comparatively scarce, it serves as a tolerable substitute. The potency of this liquor may readily be conceived; for where five barrels have been reduced to the bulk of one, that one will contain the spirit of *four* barrels, at the lowest calculation; but an allowance ought always to be made for some loss of the spirituous part, since more or less of it escapes along with the frozen water. Supposing the cider originally to have contained no more than eight per cent. of alcohol, then in the five barrels there would be forty per cent. on that quantity becoming reduced to one barrel; but allowing, as before stated, the spirit of one barrel, or eight per cent., to have been lost in the process of freezing, still there would remain thirty-two per cent. of alcohol; so that about one-third of this beverage, which is generally considered innocent and simple, is actually genuine spirit of wine.

THE DINOTHERIUM.

Some of the more remarkable of the results of osteological investigation, as connected with geological researches, have been presented to the reader in previous portions of the 'Penny Magazine.' Osteology is that branch of science which describes and classifies the *bones* of animals. By means of it the comparative anatomist, in junction with the geologist, has been enabled to make many wonderful discoveries respecting the forms and habits of animals extinct for many thousand years. "A comparative anatomist, of pro-

[Professor Kaup's restoration of Dinotherium giganteum.]

found learning and marvellous sagacity, has presented to him what to common eyes would seem a piece of half-decayed bone, found in a wild, in a forest, or in a cave. By accurately examining its shape, particularly the form of its extremity or extremities (if both ends happen to be entire) by close inspection of the texture of its surface, and by admeasurement of its proportions, he can with certainty discover the general form of the animal to which it belonged, its size as well as its shape, the economy of its viscera, and its general nabits. Sometimes the investigation in such cases proceeds upon chains of reasoning, where all the links are seen and understood; where the connexion of the parts found with other parts and with habitudes is perceived and the reason understood—as that the animal had a trunk because the neck was short compared with its height; or that it ruminated because its teeth were imperfect for complete mastication. But frequently the inquiry is as certain in its results, although some links of the chain are concealed from our view, and the conclusion wears a more empirical aspect—as gathering that the animal ruminated, from observing the print of a cloven hoof, or that he had horns from his wanting certain teeth, or that he wanted the collar bone from his having cloven hoofs. Limited experience having already shown such conclusions as facts, more extended experience will assuredly one day enable us to comprehend the reason of the connexion*."

Cuvier, judging from the form of the molar teeth of the dinotherium, which nearly resembles that of the tapirs, supposed them to be a gigantic species of that genus. Professor Kaup has since described the dinotherium as an extinct genus, holding an intermediate place between the tapir and the mastodon. Fragments of the bones of this genus have been found in several parts of France, and in Bavaria and Austria: the most abundant remains were found at Applesheim, in the province of Hesse Darmstadt, where an entire head—the most perfect portion hitherto found—was discovered in the autumn of last year (1836).

The dinotherium is described as having been the largest of terrestrial mammalia; one species of the genus—*Dinotherium giganteum*—has been calculated both by Cuvier and Kaup to have attained the extraordinary length of eighteen feet. Dr. Buckland, in his 'Bridgewater Treatise,' (vol. i., pp. 137, 138) thus states what has been conjectured respecting the habits of the dinotherium:—

"It is mechanically impossible that a lower jaw, nearly four feet long, loaded with such heavy tusks at its extremity, could have been otherwise than cumbrous and inconvenient to a quadruped living on dry land. No such disadvantage would have attended this structure in a large animal destined to live in water; and the aquatic habits of the family of Tapirs, to which the dinotherium was most nearly allied, render it probable that, like them, it was an inhabitant of fresh-water lakes and rivers. To an animal of such habits, the weight of the tusks sustained in water would have been no source of inconvenience; and if we suppose them to be employed as instruments for raking and grubbing up by the roots large aquatic vegetables from the bottom, they would, under such service, combine the mechanical powers of the pick-axe with those of the horse-harrow

* 'A Discourse of Natural Theology,' by Lord Brougham, p. 45.

of modern husbandry. The weight of the head, placed above these downward tusks, would add to their efficiency for the service here supposed, as the power of the harrow is increased by loading it with weights. The tusks of the dinotherium may also have been applied with mechanical advantage to hook on the head of the animal to the bank, with the nostrils sustained above the water, so as to breathe securely during sleep, whilst the body remained floating at perfect ease beneath the surface; the animal might thus repose, moored to the margin of a lake or river, without the slightest muscular exertion, the weight of the head and body tending to keep and fix the tusks fast anchored in the substance of the bank; as the weight of the body of a sleeping bird keeps the claws clasped firmly around its perch. These tusks might have been further used, like those in the upper jaw of the walrus, to assist in dragging the body out of the water; and also as formidable instruments of defence. The structure of the scapula already noticed, seems to show that the fore leg was adapted to co-operate with the tusks and teeth, in digging and separating large vegetables from the bottom. The great length attributed to the body, would have been no way inconvenient to an animal living in the water, but attended with much mechanical disadvantage to so weighty a quadruped upon land." In a note in the second volume of the work, (p. 19) Dr. Buckland adds,—"From the near approximation of this animal to the living tapir, we may infer that it was furnished with a proboscis, by means of which it conveyed to its mouth the vegetables it raked from the bottom of lakes and rivers by its tusks and claws."

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subject of a work by Professor Kaup and Dr. Klipstein. In this work (which was published at Darmstadt) they confirm the conjectures of Dr. Buckland respecting the habits of the animal. In accordance with these views, Professor Kaup has given a restoration of *Dinotherium giganteum*, in which he has supplied the animal with a proboscis, and given its form as somewhat resembling that of the tapir.

The head has been carried to Paris, and from its inspection the French naturalists appear to have differed in opinion from Professor Kaup and Dr. Buckland as to the form and character of *Dinotherium*. At a sitting of the Académie Royale des Sciences, on the 20th of March of the present year, M. de Blainville read a note, detailing his views, in which he says, "The dinotherium was an animal of the family of the Lamantins, or Aquatic Gravigrades, its proper position being at the head of the family, preceding the dugong, and consequently preceded by the tetracaulodon, which ought to terminate the family of the Elephants. In a word, the animal, in our opinion, was a dugong with tusk-incisors. We must then suppose that it had only one pair of anterior limbs, with five toes on each. As to the supposition that the animal was provided with a trunk, which might be presumed from the great nasal opening, the enlarged surfaces which surround it, and the size of the suborbital nerve, as far as it may be judged of from the size of the suborbital hole, we believe that that is at least doubtful, and that it is more probable that these dispositions bear relation to a considerable development of the upper lip and the necessary modification of the nostrils in an aquatic animal, as is equally the case in the dugong."

On this opinion the author of the article DINOTHERIUM, in the 'Penny Cyclopædia,' says, "Without venturing to give any opinion as to the true position of this interesting genus in the animal series till an opportunity has been afforded of examining the skull itself, we may be permitted to observe, that the evidence on which M. de Blainville is stated to have rested for the cetaceous character of dinotherium, appears to us to be rather meagre, and hardly sufficient to warrant the conclusion. It is true that he is supported by the respectable names of MM. Duméril and Isidore Geoffroy Saint-Hilaire; but if the report be correct, the examination of the skull and the whole proceeding at the sitting of the 20th of March, with reference to dinotherium, bear traces of a somewhat hasty character."

ICE-MAKING IN BENGAL.

MANY persons suppose that there is no ice in India, and it has even been said that there is no word meaning ice in the languages of that country; but this is an error. It freezes regularly during the winter in many of the northern provinces, and even in the burning climate of Bengal ice may be procured at a moderate price at certain seasons of the year. Ice cannot be obtained in the warmer parts of India without some degree of art, although it must not be denominated an entirely artificial production, as mere exposure to the air under peculiar circumstances is sufficient to produce it. The means adopted by the natives of Bengal for this effect are well described by Dr. Wise, of Calcutta, who has investigated the subject with much attention, and considerably extended the manufacture.

A certain tract in the neighbourhood of the town of Hoogly is chosen for the production of ice; upon what circumstances its peculiar adaptation depends appears to be unknown, but the attempts to make ice in other places have invariably afforded a much less quantity than in this favoured spot. The preference is by no means fanciful; for although Hoogly is distant forty miles from Calcutta, which is, as might be supposed, the principal market for the produce, and notwithstanding the expense, as well as great waste, attending its passage to that city, yet all the native ice consumed in Calcutta is made at Hoogly, and in the tract above alluded to.

The good season for making ice does not last much above six weeks, though small quantities may be produced a fortnight or more before and after the best period; extending the whole time to ten or eleven

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ICE-MAKING IN BENGAL.

MANY persons suppose that there is no ice in India, and it has even been said that there is no word meaning ice in the languages of that country; but this is an error. It freezes regularly during the winter in many of the northern provinces, and even in the burning climate of Bengal ice may be procured at a moderate price at certain seasons of the year. Ice cannot be obtained in the warmer parts of India without some degree of art, although it must not be denominated an entirely artificial production, as mere exposure to the air under peculiar circumstances is sufficient to produce it. The means adopted by the natives of Bengal for this effect are well described by Dr. Wise, of Calcutta, who has investigated the subject with much attention, and considerably extended the manufacture.

A certain tract in the neighbourhood of the town of Hoogly is chosen for the production of ice; upon what circumstances its peculiar adaptation depends appears to be unknown, but the attempts to make ice in other places have invariably afforded a much less quantity than in this favoured spot. The preference is by no means fanciful; for although Hoogly is distant forty miles from Calcutta, which is, as might be supposed, the principal market for the produce, and notwithstanding the expense, as well as great waste, attending its passage to that city, yet all the native ice consumed in Calcutta is made at Hoogly, and in the tract above alluded to.

The good season for making ice does not last much above six weeks, though small quantities may be produced a fortnight or more before and after the best period; extending the whole time to ten or eleven

weeks—from the end of November to the middle of February.

In preparing the spot for the purpose of ice-making, the natives usually hollow out a piece of ground about 120 feet in length by 20 feet wide, to a depth of two feet, which they make as smooth as they can, and allow to dry by exposure to the sun. When quite dry, this hollow is covered with bundles of rice straw to the depth of a foot, or more, and then loose straw is strewed in, to a height within six inches of the surface of the adjoining land. Upon this bed of loose straw, the pans which are to contain the water to be frozen, are arranged in regular order. These pans or dishes are a sort of saucer, not much unlike those we place under our garden pots, but narrower in proportion towards the bottom. They are about nine inches wide at top, one inch and a half in depth, and a quarter of an inch thick: they are unglazed, and so porous, that they become moist throughout their substance when water is poured into them. When the air towards evening is below 50° of Fahrenheit (18° above the freezing point), and there is a gentle breeze from the north or west, ice may be expected, and preparations are accordingly made for collecting it. The saucers are arranged in regular rows upon the straw, close to each other, the whole bed containing about 5000 or 6000. The people then take bamboo rods, long enough to reach half way across the bed: the rods are furnished with little earthen pots fastened to the ends, for the purpose of filling the saucers. The little pots are filled with soft pure water, taken from large water jars sunk deep into the ground near the ice beds, and previously filled with water from pools in the neighbourhood, or with drainings from the ice of preceding operations. The natives put more or less water into each dish, according as they expect a more or less favourable night for their purpose; and this they are enabled to foresee from the direction and steadiness of the wind, and clearness of the sky. A N.N.W. wind is the most favourable; any point from N. to W. will do; but if the wind is anywhere between E. or S. no ice is expected, nor is any preparation made. A change of wind during the night to the unfavourable points will even re-melt any ice that may have been produced at an early hour. A state of calm is rather prejudicial, and a rough wind decidedly bad. About half a pint of water is poured into each dish in the most favourable nights; but at other times this quantity is diminished to a quarter or even an eighth of a pint.

Everything being now disposed, Nature is left to do her own work; but her operations are carefully watched by persons stationed by the side of each ice-bed. The freezing usually begins something before midnight. So soon as the attendants perceive a slight film of ice forming over the surface of the pans, they mix together the contents of several of them, and sprinkle the freezing liquid over the remaining dishes, which they have found from experience, considerably increases the quantity produced on the whole. The freezing continues all the night with accelerated force, and at sunrise the ice will be found in all the dishes to the thickness perhaps of half an inch or more. Dr. Wise states that he has seen ice seven-tenths of an inch thick, and that in very favourable nights the whole of the water contained in the pans becomes one solid mass. In such cases the ice sticks so fast to the rough unglazed earthenware, that it cannot be removed until partially dissolved; and the natives are frequently compelled to wait until the sun is two hours and a half above the horizon, before they can effect it.

The removal of the ice is generally accomplished by women, of whom seven or eight are stationed at each ice-bed. They use for the purpose a blunt semicircular knife, with which they scoop out the ice, and then throw it, water and all together, into earthen vessels placed near them, which are dragged along as they advance in their work. When these vessels are full, their contents are poured into conical-shaped baskets, placed over the large water-jars which have been mentioned before, as supplying the water for icing. By this arrangement the cold produced is economized to a considerable extent; for the water which runs from the collected ice falls through the crevices of the basket into the water-jars, cooling their contents very materially, in furtherance of the next night's operations. In this manner the degree of cold produced in the pans which may not have been sufficient to freeze all the water, is not wasted, as it would be if the unfrozen water were thrown away, or left in the pans to be heated by the sun in the day-time, which even at this time of the year frequently produces a higher temperature than that of our hottest summer days.

The ultimate places of deposit of the ice thus manufactured are circular wells, about twelve feet deep by nine in diameter, well lined with mats, and covered over with a straw shed; but as these wells are, for the most part, constructed in situations at some distance from the ice-beds, it would hardly be practicable to deposit the ice in them before the day should be advanced, when the heat of the sun would rapidly melt all ice not under close cover. The ice taken out of the baskets is consequently immediately placed in temporary wells of smaller dimensions, constructed very near the ice-beds, where it is allowed to remain during the day, and whence it is removed to the large pits on the following night. However well these pits may be defended, it is not possible to prevent some degree of melting; a slow dripping is constantly going on, and the water thus produced is carried off through holes at the bottom of the pits to a deep well in the neighbourhood. The ice consumed in Calcutta is conveyed in boats during the night. When the weather is coldest, it is simply packed in coarse bags of country cloth, and put in bulk into the boats; but towards the beginning and end of the season, when it is dearest and most difficult to preserve, it is packed in baskets, well lined with straw mats, and care is taken that it shall reach its destination before sunrise.

There appears to be considerable difficulty in accounting for the formation of ice under the circumstances detailed. A gentle wind from the north or west appears to be essentially necessary, as is also a clear cloudless sky; but how these causes operate is not easy to understand. Evaporation is by many persons thought to be the immediate cause of the cold produced; and as the favourable winds are all dry, the evaporation may be supposed to be very great, particularly when the width and shallowness of the pans are considered. But the experiments of Dr. Wise contradict this conclusion. He placed pans of water at a small elevation above the ice-beds, but in every other respect similarly situated to those on the straw; the result in every case was, that although the quantity of water in the raised pans was much diminished by evaporation, it remained perfectly liquid while the water in the beds was covered with thick ice; and instead of evaporating it was found in all cases to be actually increased in weight by absorption. The porous nature of the unglazed earthenware is not productive of cold; Dr. Wise found that in glazed dishes placed promiscuously with those unglazed, the average quantity of ice was considerably greater than in the others, and brass pans were found to contain a still larger proportion. The straw on which the pans are arranged is an indispensable part of the apparatus from its non-conducting properties, though it cannot be a cause of cold. When ice was abundantly formed in the ordinary manner, none was found in pans placed in the same bed without any, or with very little straw.

All the precautions hitherto taken have failed in preserving ice in the hot season in any quantity, although Dr. Wise, who has greatly extended and improved the native process, has partially succeeded, and has formed hopes of complete success. The first heavy fall of rain usually melts all that may be left to that season, and the native of Bengal has still to envy the people of the upper provinces, who are able to procure ice all the year round. But American enterprise bids fair to supply this long-desired luxury; a cargo of solid ice shipped at Boston was discharged at Calcutta in September, 1833. This ice being much more solid than the produce of the country, was calculated to resist the heat much better; and it was so much cheaper, that it would still find purchasers, though half of it should be wasted by melting. The price at which this ice was offered was 3*d.* per lb., while the native ice could not be sold under 6*d.* The Americans expected, by improved methods of packing, to lower the price of future consignments one-half.

The vessel which conveyed the ice was fitted up in a peculiar manner. A flooring of deal an inch in thickness, was laid down upon the dunnage, and covered with a layer of refuse tan or bark, well dried; upon this was laid another floor of deal like the first. All the four sides of the ice-chamber were made in the same way, of double planking, with a layer of tan between them; the pump, well, and mainmast, which passed through the chamber, were all boxed up in the same manner, and insulated. In this chamber the ice was packed in large cubes fitting close together, so as to form one solid mass. The ice was covered in with a deal planking, which nearly reached the floor of the lower deck, between which and the planking another layer of dried tan was stuffed. The whole quantity shipped was 180 tons, of which something more than sixty wasted on the voyage, and nearly twenty on the passage up the river to Calcutta, and in stowing away. The whole quantity deposited in the ice-house was 100 tons. A floating gauge and rod had been fitted to the ice-chamber to ascertain the diminution on the voyage, but it failed to indicate the quantity wasted, from the unexpected circumstance of the melting taking place between the cubes as deposited, and not on the surface. Dr. Spry, in his 'Modern India,' recently published, states that two other vessels with similar cargoes have since arrived at Calcutta.

SECRET SOCIETIES OR FRATERNITIES.

In such a country as Great Britain, it may be safely laid down as a general rule that secret associations, especially those whose object is to aim at political power, can seldom be based on sound moral principles. The very concealment itself, apart from the matters which it conceals, has a tendency to pervert the moral vision, and to dispose the mind to confound the distinctions between right and wrong. There are, unfortunately, to be found, scattered here and there in society, individuals of considerable mental activity, but whose restlessness and ambition are but little controlled by a sense of moral and social obligation. Such characters, too frequently, are the founders of secret associations, or they creep into them; and either contrive to lead the mistaken men who compose them into perilous courses, or they betray them. Illustrations of the evils arising from secret associations are not wanting in the history of this and other countries where anything like liberty of action is enjoyed.

But it is in the East that we shall find illustrations of the evils of secret associations, which are startling and appalling in their nature. Arbitrary, capricious, and cruel government, either in a nation or a household, is calculated to make the subjects of it cautious and cunning, and either reckless and vindictive or abject and deceitful. Thus the proverbial character of the Jews is, in great part, to be attributed to the shocking way in which, down till a comparatively recent period, they were treated. The various and fluctuating despotisms of the East have been peculiarly reckless of life and property. If to this we add, a passive endurance in disposition along with a subtle and crooked intellect, we may find some clue to the causes how secret associations have sprung up in oriental countries, in which men have been trained to regard crime of the most shocking character as a duty, and a chief object of their existence. Even with this view of the matter, it is difficult to understand how the intellect and moral sense can be so perverted, as some of the following illustrations display. Let us bear in mind, however, that both in this country and in France we have had recent individual examples of that restless mental activity, and feeble moral control, which, when once involved in bad purposes or schemes, too frequently lead to the commission of some horrid crime.

"There exist," says a recent Number of the 'Edinburgh Review,' "in India, a vast fraternity of murderers, consisting of many thousands of persons. This fraternity has existed for many ages, and through many political revolutions;—it has spread its ramifications over the whole of that vast country, from Cape Comorin to the Himalayas;—it has flourished alike under Hindu, Mohammedan, and British rulers;—it has every year destroyed multitudes of victims: yet its constitution—we may say its very being—has been quite unknown to the most active and vigilant English functionaries, and very imperfectly understood even by the native governments. It was indeed notorious that gangs of thieves sometimes strangled travellers. It was notorious that the members of these gangs were unusually expert at the operation of strangling. But that these gangs were merely small detached portions of a vast organized community, the members of which recognized each other as brethren in the remotest parts of India—that these murders were all committed according to certain ancient and solemn forms, and were regarded by those who committed them, not as crimes, but as solemn rites, which it would have been sinful to omit—all this it was reserved for the present generation to discover. One of the many obligations which India owes to Lord William Bentinck is the complete unveiling of this horrible and portentous system."

These extraordinary people are known by the name of Thugs, and their profession is called Thuggee. They travel along the roads under various assumed characters, in parties varying from ten or twelve to several hundreds. Their victims are almost always travellers. They never put them to death till they have a safe opportunity, even if it should be necessary to follow them hundreds of miles before they obtain one. Yet in every respect in which their peculiar tenets do not clash with the ordinary rules of morality, these professional murderers are not only blameless, but even exemplary in the performance of the various duties of life. The most hardened Thugs not unfrequently gain the esteem of the European officers employed in seizing them by the propriety of their conduct, and the mild decorum of their manner.

The Thugs of India present, in some respects, a remarkable modern contrast with the Assassins of more ancient times. There is this important difference between them, however—the Thugs murder and rob; in murdering they believe that they gratify the sanguinary deity whom they worship, and in robbing their victims they gratify that avarice which, with deceit and cunning, enter so largely into the Hindu character. Superstition and the more depraved propensities prompt them to "hunt for the precious life." But the Assassin

did not rob. He struck down his victim in obedience to one whom he believed to be a messenger of God; and in murdering, even at the risk of falling a victim himself, thought he was at once administering the justice of heaven, and earning heaven as his reward for the action. The Assassins still exist, as a sect, both in Persia and Syria—but their doctrine is now merely one of the speculative heresies of Mohammedanism. Six centuries have nearly passed away since the destruction of their political organization; but their history is one of the more remarkable of historical phenomena.

In the introduction of a recently-published volume of the 'Library of Entertaining Knowledge,' it is stated, that its object is to give "the history of three celebrated societies which flourished during the middle ages, and of which, as far as we know, no full and satisfactory account is to be found in English literature*. These are—the Assassins, or Ismailites of the East, whose name has become, in all the languages of Europe, synonymous with *murderer*, who *were* a secret society, and of whom we have in general such vague and indistinct conceptions;—the military order of the Knights Templars, who were most barbarously persecuted under the pretext of holding a secret doctrine, and against whom the charge has been renewed at the present day;—and, finally, the Secret Tribunals of Westphalia, in Germany, concerning which all our information has hitherto been derived from the incorrect statements of dramatists and romancers."

The name "Assassins" has been commonly derived from that of the founder of this extraordinary confederacy, Hassan Sabah: but M. De Sacy has made it probable that the Oriental term Hashisheen, of which the Crusaders made Assassins, comes from Hashish, a species of hemp, from which intoxicating opiates were made, which the assassins were in the habit of taking previously to engaging in their daring enterprises, or employed as a medium of procuring delicious visions of the paradise promised to them by the Sheikh-al-Jebal, or Mountain Chief. The word *sheikh* signifies either an *elder* or *chief:* and the early European historians, mistaking the meaning of the appellation of the head of the Assassins, rendered Sheikh-al-Jebal by "Old Man of the Mountain."

Hassan Sabah, a remarkable man, but whose cast of mind appears to have been peculiarly fitted for the formation of a secret association, after various vicissitudes in life (his origin was somewhat obscure), contrived to gain a number of adherents to certain doctrines,—such as the Mohammedans, using our mode of expression, would call a heresy, or dissent from the prevailing and orthodox belief. He then, in the year 1090, contrived, by dexterity and fraud, to make himself master of an important hill-fortress, called Alamoot (*i. e.* the Vulture's Nest), one of the strongest of fifty fortresses of the same kind which were scattered over the district of Roodbar (River-land), the mountainous region which forms the border between Persian Irak and the more northerly provinces of Dilem and Taberistan. Here he reigned for thirty-four years, during which time he had never been seen out of the Castle of Alamoot, and had been even known but twice to leave his chamber, and to make his appearance on the terrace. In silence and in solitude he pondered the means of extending the power of the society of which he was the head, and he drew up, with his own hand, the rules and precepts which were to govern it. His followers were ready, at his command, to lay down their lives. At his nod, they would assume any disguise, travel any distance, wait and watch with patience any period, till they got a favourable opportunity for dispatching the victim he had marked out. Sultan Sanjar, who was, in Hassan's time, the most powerful monarch of the East,—whose mandate was obeyed from Cashgar to Antioch—from the Caspian to the Straits of Bab-el-Mandeb—on his march to lay siege to Alamoot, found, on awaking one morning, a dagger struck in the ground close to his pillow. The Sultan was dismayed, but he concealed his terror, and a few days afterwards there came a brief note from Alamoot, containing these words, "Were we not well affected towards the Sultan, the dagger had been struck in his bosom,—not in the ground!" In the early part of the twelfth century the dread of the followers of Hassan Sabah had sunk deep into the hearts of all the princes of the East—for there was no security against their daggers.

The political organization of the Assassins lasted rather more than a century and a half. After Hassan's death, a number of heads of the confederacy bore, in succession, the title of Sheikh-al-Jebal. At last Alamoot was taken by the Mongols, under Hoolagoo, the brother of Mangoo, the grandson of the celebrated Chingis Khan. Marco Polo, the Venetian traveller, resided a long time at the court of Mangoo. The conquerors, in addition to Alamoot, destroyed or took possession of all the castles of the Ismailites, amounting to upwards of 100 in number. There fell, also, in indiscriminate massacre, upwards of 12,000 Ismailites. The process was short: wherever a member of the society was met with, he was, without any trial, ordered to kneel down, and his head instantly rolled on the ground. We can hardly wonder at this retaliatory vengeance.

In a subsequent paper, we shall give some account of the Secret Tribunals of Westphalia, whose history possesses as much interest as that of the Assassins, with far less of its sanguinary character.

* Since the above work was prepared, a translation of Von Hammer's 'History of the Assassins' has been published by Dr. Oswald Charles Wood.

Proof of Design in the Origin of Iron and Coal.—The important uses of coal and iron in administering to the supply of our daily wants, give to every individual amongst us, in almost every moment of our lives, a personal concern, of which but few are conscious, in the geological events of very distant eras. We are all brought into immediate connexion with the vegetation that clothed the ancient earth before one-half of its actual surface had yet been formed. The trees of the primeval forests have not, like modern trees, undergone decay, yielding back their elements to the soil and atmosphere by which they had been nourished; but, treasured up in subterranean storehouses, have been transformed into enduring beds of coal, which in these later ages have become to man the sources of heat, and light, and wealth. My fire now burns with fuel, and my lamp is shining with the light of gas, derived from coal that has been buried for countless ages in the deep and dark recesses of the earth. We prepare our food, and maintain our forges and furnaces, and the power of our steam-engines, with the remains of plants of ancient forms and extinct species, which were swept from the earth ere the formation of the transition strata was completed. Our instruments of cutlery, the tools of our mechanics, and the countless machines which we construct by the infinitely varied application of iron, are derived from ore for the most part coeval with, or more ancient than, the fuel, by the aid of which we reduce it to its metallic state, and apply it to innumerable uses in the economy of human life. Thus, from the wreck of forests that waved upon the surface of the primeval lands, and from ferruginous mud that was lodged at the bottom of the primeval water, we derive our chief supplies of coal and iron—those two fundamental elements of art and industry, which contribute more than any other mineral production of the earth, to increase the riches, and multiply the comforts and ameliorate the condition of mankind.—*Dr. Buckland's Bridgewater Treatise.*

*** The Office of the Society for the Diffusion of Useful Knowledge is at 59, Lincoln's Inn Fields.

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